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III. Geographical distribution. (1) Original home. (2) Present areas of growth.

IV. Cultivation : soil, climate, etc.

V. Preparation for food. (1) Primitive methods. (2) Present methods : (a) threshing, etc.; (b) milling.

VI. Storage and transportation.

VII. Commercial value.

VIII. Special study of wheat. (1) Structure of plant. (2) Structure of grain. (2) Comparison with other cereals.

IX. Experiments to separate from flour : (1) starch, (2) gluten.

X. Cookery.

XI. Food value.

REFERENCES: Chase and Clow, *Stories of Industry*; Sargent, *Corn Plants*; Pratt, *Fairyland of Flowers* (for story of Ceres); Baldwin, *Old Greek Stories*; *The Great World's Farm*; "Breeding New Wheats," *World's Work*, May, 1901; *American Kitchen Magazine*, December, 1900; September, 1901; *Monograph on American Social Economics*, No. 3.

MANUAL TRAINING.

IRA M. CARLEY.

THE working-drawings, Figs. 1 and 2, are of a small oak table which was made (and planned, to a considerable extent) by a boy of the eighth grade. It is reproduced here, partly because it proved, when completed, to be of quite pleasing design, and partly to show how largely mathematics enters into even very simple problems in construction.

The first step in making the plan was the free-hand sketch. This was worked over and changed until it appeared satisfactory in proportions and construction. The next step was to decide on the scale for the working-drawing. It was decided to make the drawing one-fourth actual size. All the main dimensions were then reduced to this scale. In this particular case this involved, of course, only very simple operations in fractions.

The number of planes of projection necessary, or the number of "views" to be shown, was found to be two, namely, the "plan" and an elevation. After the circle representing the outline of the plan had been drawn, the next problem was to divide it into three equal parts, to locate the centers of the legs.

This might have been done, of course, by using a 30° drawing triangle on the T-square, but it was not suggested by anyone, so the value in degrees of one-third the circle was taken. Then the construction of an angle of 120° at the center of the circle was seen to be required.

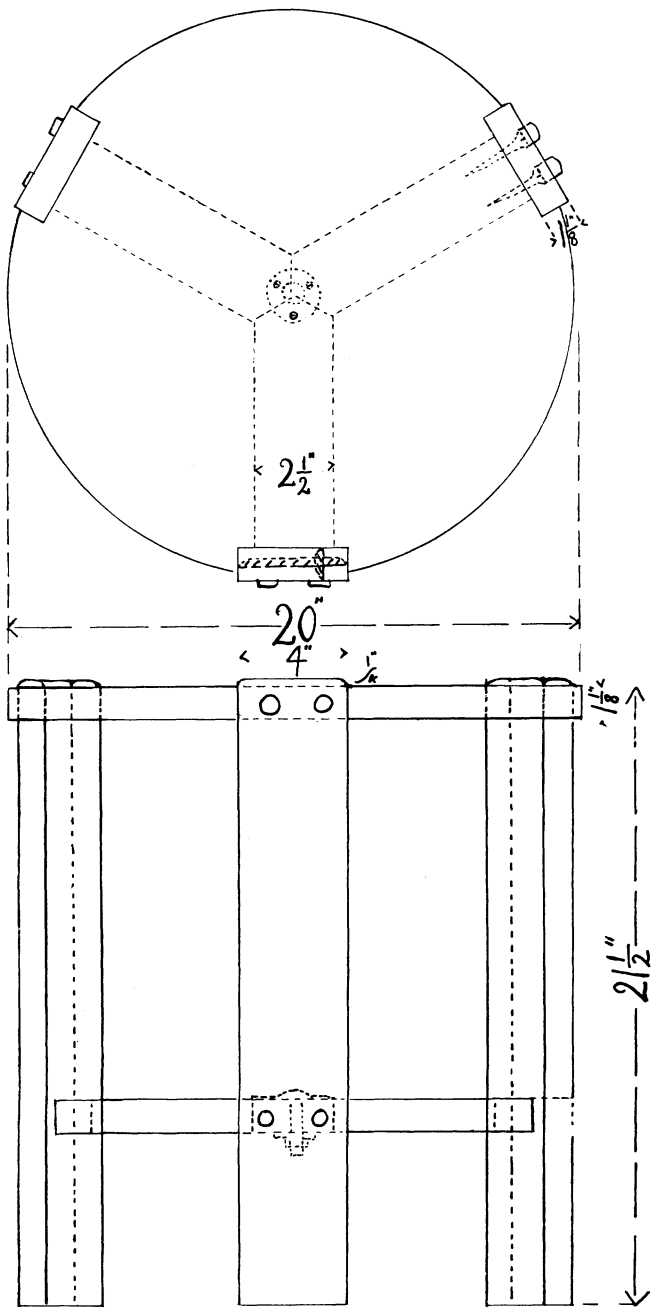


FIG. 1.—OAK TABLE.

The equilateral triangle was used as a means to this end, and finally it was found that the radius of a circle, laid off as a chord, cut off an arc of 60° . So this chord was used twice to lay off the third of the circumference.

Having laid off the center points for the legs, it was next necessary to draw the lines representing the faces of the legs, AD , etc., perpendicular to the radius, going through the middle point. To do this, the radius PB was drawn and extended, and at point O a perpendicular was erected; the construction being repeated at each corresponding point on the other legs. At point P another perpendicular was erected on which to lay off the width of the brace. In this and the corresponding cases, the construction for erecting a perpendicular at the end of a line was used, the idea of the angle inscribed in a semicircle being always a right angle being brought forward.

In passing, attention was called to the fact that the radius PB , which was perpendicular with the chord AD , also bisected it. This was tried several times, and noted for future proof. Also that the line GH , which touched the circle where the radius intersected its circumference, was also perpendicular to the radius. In laying off the angle where the braces meet at the center, the question of supplementary angles was taken up, and of the relation of an exterior angle of a triangle to the opposite interior angles. This was done in order to be able to lay off the proper angle at which the T-level should be set to mark off the ends of the braces for sawing. In the actual construction of the table, the most difficult problem encountered was the fastening securely of the three braces where they meet at the center. This was met by using two heavy iron washers, which were drilled for screws, as shown in the plan; and to give additional rigidity, a three-eighth inch carriage bolt was used to draw them firmly together. The table was stained brown and then given a faint tinge of green, with aniline alcohol stains, and then shellacked to a dull finish.

It may be noted that in a case where an individual pupil encounters a number of typical problems, as in this instance, it seems a good plan to have them worked out by the whole class.

In addition to the wood-work for Christmas, several quite satisfactory attempts were made in copper-work. Among these

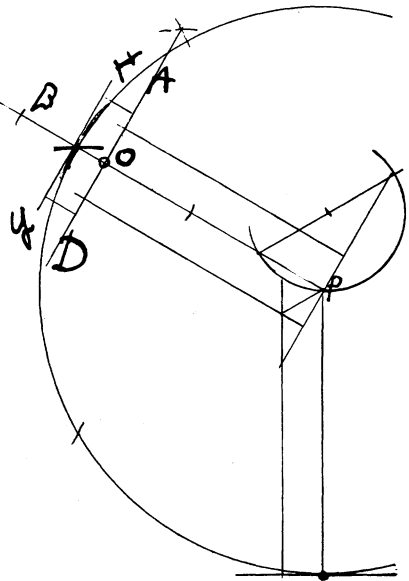


FIG. 2.

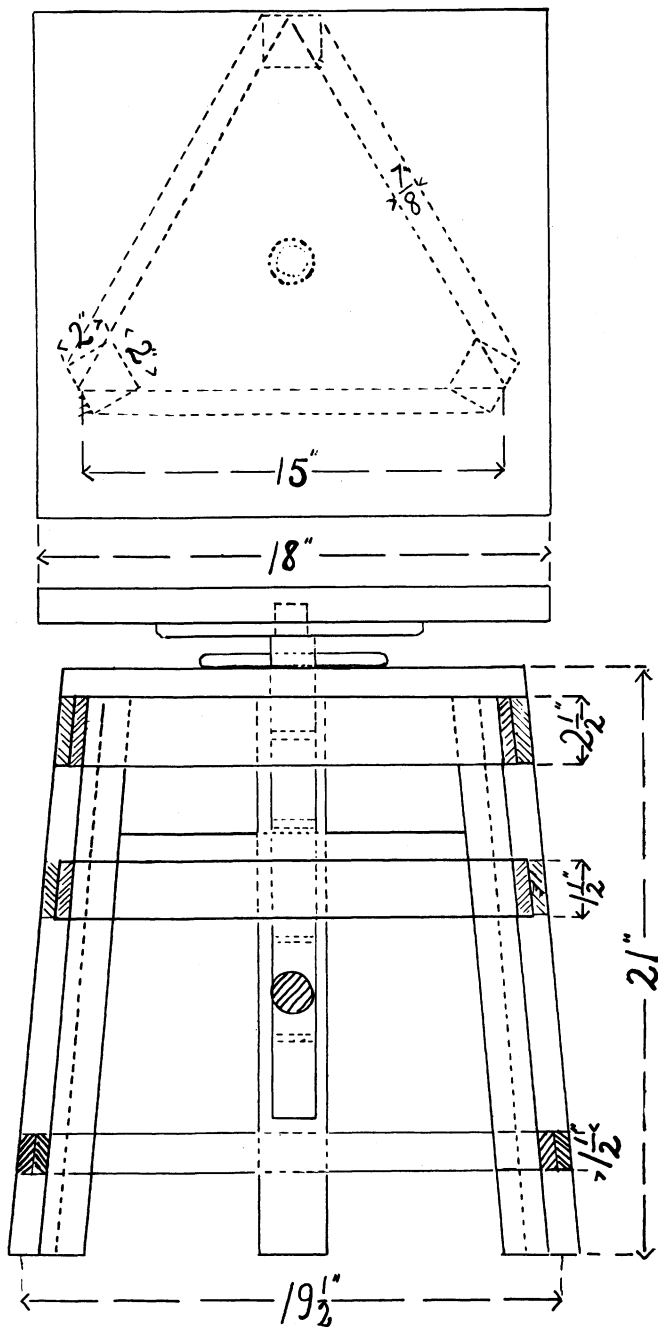


FIG. 3.—CLAY-MODELING STAND.

may be mentioned hasps, hinge- and lock-plates for cabinets and boxes, and corners for small chests. Several pen trays and ash trays, also, were beaten out of sheet copper and decorated in repoussé. A description of this work, with working directions, will be given in a future number of the COURSE OF STUDY.

The drawing numbered 3 is a plan of a modeling-stand which is being worked out by the pupils of the seventh and eighth grades. Sixteen of these stands will be made for the clay-room.

A HOME-MADE POTTERY KILN.

IRA M. CARLEY.

DURING the session of the School of Education in the Kozminski School last summer, a kiln for burning work in clay-modeling was built of brick, under the direction of Miss Antoinette B. Hollister. A kiln may be purchased for about a hundred dollars. This kiln of brick was built to demonstrate how cheaply a serviceable kiln can be constructed. The cost of the material was in the neighborhood of eight dollars. With the labor, a good bricklayer for two days and a helper for one day, the total cost approximated twenty dollars. The kiln may be built either indoors or out. Below are given plans of it and directions for building :

The kiln is built entirely of fire brick, laid in fire clay. The sides, floor, and top of the muffle, *MM*, are built of fire brick of half the thickness of those used for the outside.

Before beginning to build the kiln, if made out-of-doors, a hole about one foot deep, and of the dimensions of the ground space to be occupied by the kiln, should be dug and filled with loose stones and cinders. On the upper layer of cinders a floor of common brick is laid level with the ground.

Fig. 1 shows the ground plan, or, rather, a horizontal section an inch above the ground, the rows of bricks, *eeee*, being simply to support the floor above. The opening and fireplace are at *A*.

Fig. 2 shows the horizontal section at *FF* (see Fig. 5); that is, the floor above Fig. 1. This floor is built of large fire brick. *H* is the hole by which the heat passes under and around the muffle.

Fig. 3 shows the floor of the muffle. The cut is a horizontal section at *OO* (Fig. 5). The floor of it is made of the thin brick, supported by pieces